PATENT ABSTRACTS OF JAPAN

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(54) EQUIPMENT AND METHOD FOR RECORDING INFORMATION AND EQUIPMENT AND METHOD FOR TRANSMITTING INFORMATION

(57)Abstract:
PROBLEM TO BE SOLVED: To enable execution of efficient recording.
SOLUTION: An audio signal is sampled in an audio signal A/D conversion system 11 and supplied to an audio signal feature extraction system 13 and a feature amount is extracted. In an audio signal feature discrimination system 14it is determinedon the basis of the feature amountwhether the audio signal is a voice signal of a human voice or a music signal of a musical piece or the like. In the case when the audio signal is the voice signala sampling frequency in the audio signal A/D conversion system 11 is made a low frequency (fsa) and thereby the voice signal is sampled by a clock of the low frequency (fsa) and recorded at a low recording rate. In the case when the audio signal is the music signalthe sampling frequency in the audio signal A/D conversion system 11 is made an ordinary frequency (fs(>fsa)) and thereby the music signal is sampled by a clock of the ordinary frequency fs and recorded at an ordinary recording rate.

CLAIMS

[Claim(s)]
[Claim 1]An information storage device which records inputted informationcomprising:
A detection means to detect characteristic quantity of said information.
A control means which controls a recording rate of said information corresponding to said characteristic quantity detected by said detection means.

[Claim 2]The information storage device according to claim 1 which said information is an audio signal and is characterized by said detection means extracting the characteristic quantity from said audio signal.
[Claim 3]The information storage device according to claim 1 which said information is a video signal and is characterized by said detection means detecting the characteristic quantity from said video signal.

[Claim 4]The information storage device according to claim 1wherein characteristic quantity of said information is superimposed by the information and said detection means detects said characteristic quantity on which said information is overlapped.
[Claim 5]An information storage method being the information storage method which records inputted informationdetecting characteristic quantity of said informationand controlling a recording rate of said information corresponding to said characteristic quantity.
[Claim 6]Information transmission equipment which transmits inputted informationcomprising:
A detection means to detect characteristic quantity of said information.
A control means which controls a transmission rate of said information corresponding to said characteristic quantity detected by said detection means.

[Claim 7]An information transmission method being an information transmission method which transmits inputted informationdetecting characteristic quantity of said informationand controlling a transmission rate of said information corresponding to said characteristic quantity.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention about an information storage devicethe information storage methodinformation transmission equipmentand an information transmission methodFor exampleit is related with the information storage device and the information storage method of enabling it to reduce the amount of information in the case of recording or transmitting informationincluding an imagea soundetc.information transmission equipmentand an information transmission method.
[0002]
[Description of the Prior Art]These daysby development of the bandwidth compression art represented by MPEG (Moving Picture Experts Group) coding etc.for example. The possible consumer appliances (for examplean optical disk unita hard disk driveetc.) of recording informationincluding a soundan imageetc.on recording mediasuch as an optical disc and a magnetic disk (hard disk)comparatively for a long time are realized.
[0003]
[Problem(s) to be Solved by the Invention]Howeverfor there to be a limit in the capacity of a recording mediumtherefore to record more information on the recording medium of such limited capacity efficiently is desired.
[0004]This invention is made in view of such a situationreduces the amount of informationand enables it to perform record of more informationetc. efficiently.
[0005]
[Means for Solving the Problem]Written this invention is characterized by a device comprising the following at claim 1.
A detection means to detect characteristic quantity of information.
A control means which controls a recording rate of information corresponding to

characteristic quantity detected by a detection means.

[0006]An information storage method according to claim 5 detects characteristic quantity of informationand controls a recording rate of information corresponding to characteristic quantity.
[0007]written this invention is characterized by it having been alike and comprising the following at claim 6.
A detection means to detect characteristic quantity of information.
A control means which controls a transmission rate of information corresponding to characteristic quantity detected by a detection means.

[0008]The information transmission method according to claim 7 detects characteristic quantity of informationand controls a transmission rate of information corresponding to characteristic quantity.
[0009]In the information storage device according to claim 1a detection means detects characteristic quantity of information and a control means is made as [control / a recording rate of information] corresponding to characteristic quantity detected by a detection means.
[0010]In an information storage method according to claim 5characteristic quantity of information is detected and it is made as [control / a recording rate of information] corresponding to characteristic quantity.
[0011]In the information transmission equipment according to claim 6a detection means detects characteristic quantity of information and a control means is made as [control / a transmission rate of information] corresponding to characteristic quantity detected by a detection means.
[0012]In the information transmission method according to claim 7characteristic quantity of information is detected and it is made as [control / a transmission rate of information] corresponding to characteristic quantity.
[0013]
[Embodiment of the Invention]Drawing 1 shows the example of composition of the optical disk unit which applied this invention.
[0014]For example the tuner section 1 receives the television signal of a predetermined channel transmitted via satellite connectionand a CATV network and othersdetects [a terrestrial wave and] electricitygets overand is divided into an audio signal and a video signal. This audio signal or video signal is supplied to the voice processing part 2 or the graphic processing part 4respectively.
[0015]The voice processing part 2 or the graphic processing part 4 processes the audio signal or video signal from the tuner section 1 under control of the system controller 3 (control means)respectively. Namelyfrom an audio signal or a video signalthe voice processing part 2 or the graphic processing part 4 extracts the characteristic quantityrespectivelyand outputs it to the system controller 3. the system controller 3 corresponds to the characteristic quantity from the voice processing part 2 and the graphic processing part 4 -- the voice processing part 2 or the graphic processing part 4 -- each being controlled and therebyIn the voice processing part 2 or the graphic processing part 4an audio signal or a video signal is processedrespectively so that it may become a predetermined recording rate.

[0016]Each of speech processing data obtained as a result of the processing in the voice processing part 2 and graphic processing data obtained as a result of the processing in the graphic processing part 4 is supplied to the Records Department 5. The Records Department 5 records the speech processing data or graphic processing data received from the voice processing part 2 or the graphic processing part 4respectively on the optical disc 6 under control of the system controller 3.
[0017]In drawing 1the voice processing part 2the system controller 3the graphic processing part 4and the Records Department 5 constitute the signal processing part 10.
[0018]Nextdrawing 2 shows the classifying method of the audio signal treated in the optical disk unit of drawing 1.
[0019]Herean audio signal is classified into the owner correspondence item which is a signal which a user should hearand the uncorresponded item which is the other noise (it contains also when there is no sound)for example. And an owner correspondence item is classified into the voice signal which is the sound (voice) which people utteredand music signalssuch as music (music)furtherfor example.
[0020]Nextdrawing 3 shows the example of composition of a 1st embodiment of the signal processing part 10 of drawing 1.
[0021]The audio signal which the tuner section 1 outputs is made as [supply / the audio signal A/D conversion system 11]. The audio signal A/D conversion system 11 the audio signal of the analog which the tuner section 1 outputsBy sampling in the timing of the clock which the sampling signal developmental system 15 outputsit is considered as a digital audio signal and made as [supply / the audio signal bandwidth compression system 12 and the audio signal feature extraction system 13 (detection means)].
[0022]As opposed to the audio signal from the audio signal A/D conversion system 11the audio signal compression system 12 performs MPEG coding and bandwidth compression processing using wavelet transform etc.and is made as [supply / the record signal-processing system 21 which constitutes the Records Department 5].
[0023]From the audio signal supplied from the audio signal A/D conversion system 11the audio signal feature extraction system 13 extracts the characteristic quantityand is made as [supply / the audio signal feature distinction system 14]. The audio signal feature distinction system 14 is controlled by the system controller 3and based on the characteristic quantity of the sound from the audio signal feature extraction system 13It judges whether an audio signal is an owner correspondence item or it is an uncorresponded itemjudges further whether when an audio signal is an owner correspondence itemthe owner correspondence item is a voice signalor it is a music signaland is made as [output / to the system controller 3 / the decision result].
[0024]The sampling signal developmental system 15 is any of the terminal a or b sampling frequency change over switch SW_A has chosengenerates the clock of different frequency and is made as [supply / the audio signal A/D conversion system 11]. Namelywhenas for the sampling signal developmental system 15sampling frequency change over switch SW_A has chosen the terminal afor exampleWhen generating the so-called clock of the usual frequency f_s (for example44.1 kHz etc.) and having chosen the terminal bit is made as [generate / the clock of frequency f_{sa} ($<f_s$) lower than the frequency]. It is made as [perform / the change of sampling frequency change over switch SW_A / by the system controller 3]therefore the sampling frequency in the audio signal A/D conversion system 11 is made as [control / by the system controller 3].

[0025]The recognition signal developmental system 16 generates a recognition signal under control of the system controller 3and is made as [supply / the record signal-processing system 21]. Namelythe system controller 3 responds to any of f_s or the f_{sa} the sampling frequency in the audio signal A/D conversion system 11 isIt is made as [control / the recognition signal developmental system 16]and the recognition signal developmental system 16 is made as [generate / corresponding to this / the recognition signal for identifying a sampling frequency].
[0026]The above audio signal A/D conversion system 11audio signal bandwidth compression system 12audio signal feature extraction system 13audio signal feature distinction system 14sampling signal developmental system 15sampling frequency change over switch $SW_A$and recognition signal developmental system 16 constitute the voice processing part 2.
[0027]The record signal-processing system 21 is made as [multiplex / multiplex the output of the speech processing data 12 which the voice processing part 2 outputsi.e.the audio signal bandwidth compression system of the voice processing part 2and the output of the recognition signal developmental system 16and / the graphic processing data which the graphic processing part 4 outputs to the multiplexing result further]. The record signal-processing system 21 is made as [perform / addition of an error correcting codeetc.]. The signal acquired as a result of the processing in the record signal-processing system 21It is made as [supply / the optical pickup 22 for record]and the optical pickup 22 for record is made by ** recorded by emitting the light corresponding to it for the signal from the record signal-processing system 21and forming a pit on the optical disc 6. The disk drive servo system 23 is made as [control / rotation of the optical disc 6] under control of the system controller 3. The recognition signal supplied to the record signal-processing system 21 is made as [record / on the predetermined fields (for exampleTOC (Table Of Contents) etc.) of the optical disc 6].
[0028]The above record signal-processing system 21optical pickup 22 for recordand disk drive servo system 23 constitute the Records Department 5.
[0029]In drawing 3the graphic display of the graphic processing part 4 is omitted.
[0030]Nextthe operation is explained with reference to the flow chart of drawing 4.
[0031]Firstin Step S1an audio signal is inputted into the audio signal A/D conversion system 11 of the voice processing part 2and it is sampled there according to the clock which the sampling developmental system 15 outputs. Sampling frequency change over switch SW_A has chosen the beginning afor examplea terminaltherefore a sampling is performed by sampling frequency f_s here.
[0032]The audio signal sampled with audio signal A/D converter 11 is supplied to the audio signal feature extraction system 13and the characteristic quantity is extracted there (detection). This characteristic quantity is supplied to the audio signal feature distinction system 14and it is judged in Step S2 there any of an owner correspondence item or the uncorresponded items that audio signal is.
[0033]Namelywhen setting the sampled value (sampling result by audio signal A/D converter 11) of the audio signal in sample point n to s (n)the audio signal feature extraction system 13As characteristic quantity of audio signal s (n)average power P or average level M of audio signal s (n) in the predetermined section is computedfor example according to a following formula.
[0034]P= (1/N) sigma|s (n) |M=(1/N) sigma(s (n)) ^{2}[0035]N expresses the sample number

of the audio signal in the predetermined sectionand sigma expresses the summation for the section.
[0036]And the audio signal feature distinction system 14 compares average power P and average level M with a predetermined thresholdand judges any of an owner correspondence item or the uncorresponded items audio signals are in Step S2 based on the comparison result. That isin Step S2average power P and average level M judge the audio signal feature distinction system 14 as an audio signal being an owner correspondence itemwhen larger than a predetermined thresholdand when smallit judges with an audio signal being an uncorresponded itemand outputs the decision result to the system controller 3.
[0037]When judged with an audio signal being an uncorresponded item in Step S2progress to Step S6 and the system controller 3The terminal b is made to choose it as sampling frequency change over switch $SW_A$and therebythe clock of frequency f_{sa} is made to output from the sampling signal developmental system 15and it progresses to Step S7. In the system controller 3the recognition signal developmental system 16 is controlled by Step S7 to output the recognition signal corresponding to the clock of frequency f_{sa}.
[0038]And it progresses to Step S8 and record is performed. That isin this casean audio signal is sampled in the timing of the clock of frequency f_{sa} which the sampling signal developmental system 15 outputsand bandwidth compression is carried out in the audio signal bandwidth compression system 12. This audio signal by which bandwidth compression was carried out is supplied to the record signal-processing system 21is multiplexed with the recognition signal corresponding to the clock of frequency f_{sa} which the recognition signal developmental system 16 outputsand the graphic processing data which the graphic processing part 4 outputs furtherand is outputted. The output of the record signal-processing system 21 is supplied to the optical pickup 22 for recordand is recorded on the optical disc 6.
[0039]Thereforewhen an audio signal is an uncorresponded itemthe uncorresponded item is recorded with a low recording rate by being sampled with the clock of low frequency f_{sa}.
[0040]Since the uncorresponded item does not need to recordas a dotted line shows drawing 3By controlling the audio signal bandwidth compression system 12 by the system controller 3it is also possible for the output of the audio signal (here uncorresponded item) from the audio signal bandwidth compression system 12 to be stoppedand for it to be made not to perform record to the optical disc 6either.
[0041]On the other handin Step S2when judged with an audio signal being an owner correspondence itemit progresses to Step S3characteristic quantity is extracted from the audio signal (here owner correspondence item) which the audio signal A/D conversion system 11 outputs in the audio signal feature extraction system 13and it is outputted to the audio signal feature distinction system 14. In the audio signal feature distinction system 14it is judged in step S4 based on the characteristic quantity from the audio signal feature extraction system 13 any of a voice signal or the music signals audio signals are.
[0042]In step S4when judged with an audio signal being a voice signalprocessing which he followed to Steps S6 thru/or S8 one by oneand was mentioned above is performedand processing is ended.
[0043]Thereforealso when an audio signal is a voice signalthe voice signal is recorded

with a low recording rate by being sampled with the clock of low frequency f_{sa}.
[0044]On the other handwhen judged with an audio signal being a music signal in step S4progress to Step S5 and the system controller 3The terminal a is made to choose it as sampling frequency change over switch $SW_A$and therebythe clock of frequency f_s is made to output from the sampling signal developmental system 15and it progresses to Step S7. In this casein the system controller 3the recognition signal developmental system 16 is controlled by Step S7 to output the recognition signal corresponding to the clock of frequency f_s.
[0045]And it progresses to Step S8 and record is performed. That isin this casean audio signal is sampled in the timing of the clock of frequency f_s which the sampling signal developmental system 15 outputsand bandwidth compression is carried out in the audio signal bandwidth compression system 12. This audio signal by which bandwidth compression was carried out is supplied to the record signal-processing system 12is multiplexed with the recognition signal corresponding to the clock of frequency f_s which the recognition signal developmental system 16 outputsand the graphic processing data which the graphic processing part 4 outputs furtherand is outputted. The output of the record signal-processing system 21 is supplied to the optical pickup 22 for recordand is recorded on the optical disc 6.
[0046]Thereforewhen an audio signal is a music signalthe music signal is recorded with the usual recording rate by being sampled with the clock of the usual frequency f_s.
[0047]As mentioned abovesince the recording rate was controlled appropriatelythe amount of information of the signal to record can be reduced and more information can be efficiently recorded on the optical disc 6.
[0048]That isfor examplemost of the audio signal in report programssuch as newsetc. is a voice signaland if the contents can fully understand convenienteven if playback in high-quality sound which is required when listening to music is not performedthere will be no big problem. On the other handmost is a music signal andas for the audio signal in the musical program etc. which are one of the entertainment programs for exampleit is common that the reproduction in high-quality sound is required unlike the case in an above-mentioned report program.
[0049]Thenby extracting the characteristic quantity and recording by changing a recording rate based on the characteristic quantity from an audio signalNamelywhen an audio signal is a music signalby sampling frequency $f_s$sample and with the usual recording rate. When an audio signal samples by sampling frequency f_{sa} in the case of an uncorresponded item and a voice signal and records with a low recording raterespectivelyit becomes possible to record more audio signals efficiently at a low price and easily.
[0050]Although it was made to change a recording rate in an above-mentioned case by changing only the sampling frequency in the audio signal A/D conversion system 11In addition to thisa recording rate can be changed by controlling the compression ratio in the audio signal bandwidth compression system 12 etc.for example.
[0051]That isfor examplein the audio signal bandwidth compression system 12when compression processings (for exampleMPEG coding etc.) accompanied by quantization of the sampled value of the audio signal which the audio signal A/D conversion system 11 outputs are performeda low recording rate can be realized by making the quantization step coarse. For examplein the audio signal bandwidth compression system 12when

compression processing using wavelet transform is performeda low recording rate can be realized by deleting the high order coefficient obtained as a result of the wavelet transform. The audio signal bandwidth compression system 12 can be constituted from digital LPF (low pass filter) etc.and can realize a low recording rate by reducing that cut off frequency in this casefor example.

[0052]Nextdrawing 5 shows the example of composition of the portion about the processing which judges whether it is a music signal in step S4 of drawing 4 of the audio signal feature extraction system 13 of drawing 3and the audio signal feature distinction systems 14.

[0053]In the figurethe audio signal feature extraction system 13 comprises a discrete Fourier transform processor 31the logarithmic processor 32an inverse discrete Fourier transform processor 33and the spectral envelope detection system 34and the audio signal feature distinction system 14 comprises the signal comparison system 35 and the threshold setting system 36.

[0054]And the audio signal feature extraction system 13 is made as [detect / the spectral envelope] (extraction)for example as characteristic quantity used for the audio signal which the audio signal A/D conversion system 11 outputs judging a music signal or a voice signal.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram showing the example of composition of the optical disk unit which applied this invention.

[Drawing 2]It is a figure for explaining the classification of an audio signal.

[Drawing 3]It is a block diagram showing the example of composition of a 1st embodiment of the signal processing part 10 of drawing 1.

[Drawing 4]It is a flow chart for explaining operation of the signal processing part 10 of drawing 3.

[Drawing 5]It is a block diagram showing the example of composition of the audio signal feature extraction system 13 of drawing 3and the audio signal feature distinction system 14.

[Drawing 6]It is a block diagram showing the example of composition of a 2nd embodiment of the signal processing part 10 of drawing 1.

[Drawing 7]It is a block diagram showing the example of composition of a 3rd embodiment of the signal processing part 10 of drawing 1.

[Drawing 8]It is a block diagram showing the example of composition of a 4th embodiment of the signal processing part 10 of drawing 1.

[Drawing 9]It is a block diagram showing the example of composition of a 5th embodiment of the signal processing part 10 of drawing 1.

[Drawing 10]It is a block diagram showing the example of composition of a 6th embodiment of the signal processing part 10 of drawing 1.

[Drawing 11]It is a block diagram showing the example of composition of the 1 embodiment of the graphic processing part 4 of drawing 1.

[Description of Notations]

1 A tuner section and 2 A voice processing part and 3. A system controller3A input

partand 4. A graphic processing partthe 5 Records Departmentand 6 optical discs10 A signal processing part and 11 An audio signal A/D conversion system12 An audio signal bandwidth compression system and 13 audio-signal feature extraction system14 The audio signal feature distinction system15 sampling-signal developmental systemand 16 [A disk drive servo system and 31 discrete Fourier transform processor] A recognition signal developmental system and 21 A record signal-processing system and 22 The optical pickup for recordand 23 32 A logarithmic processor and 33 inverse discrete Fourier transform processor34 A spectral envelope detection system and 35 A signal comparison system36 A threshold setting system and 41 CM-detection system51 A recognition signal detection system and 61 [A video-signal-band compression system and 83 / The video-signal feature processor85 sampling-signal developmental systemand 86 recognition-signal developmental system] The number change system of channelsand 71 A scene change detection system and 81 A video-signal A/D conversion system and 82